
सफेद सीमेंट आधारित पॉलीमर पुट्टी

White Cement Based
Polymeric Putty

ICS 87.040

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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Paints, Varnishes and Related Products Sectional Committee had been approved by the Chemical Division Council.

A white cement based polymeric putty is applied in the form of a thin layer mortar, normally less than 3 mm, either on concrete substrate or a render (a layer of mortar with thickness typically of around 15 mm applied on brick/cellular block/concrete walls) to obtain a smooth even surface suitable for application of internal or external decorative paints.

The white cement based polymeric putty compositions, usually comprise of inorganic binders, fillers and additives, such as water retaining/thickening agents, anti-shrinking agents, re-dispersible polymer powders etc. to modify and improve various properties of the applied putty.

Cement usually white cement, is one of the most popular binders used in the polymeric putty.

This standard is intended to lay down the minimum specification of the finished product.

In the formulation of this standard due weightage has been given to the available national/international standards and practices prevailing in different countries in addition to relating it to the practices of this country. Considerable assistance has been derived from Singapore Housing Development Board (HDB) specification, version 2013.

The composition of the technical committee responsible for formulation of this standard is given in Annex F.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

WHITE CEMENT BASED POLYMERIC PUTTY

1 SCOPE

This standard prescribes the requirements, methods of sampling and test for white cement based polymeric putty for use as a finished skim coat on internal or external plastered surfaces.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard definitions given in IS 1303 shall apply.

4 REQUIREMENTS

4.1 Form and Condition

The material shall be homogeneous powder and shall be free from grit and other visible impurities.

4.2 Composition

White Cement shall be key ingredient in composition. The product may contain inorganic filler and other additives. The pre-mixed white polymeric putty shall be formulated with at least 1.5 percent pure polymer by mass.

4.3 Consistency

The material, after thorough mixing by suitable mixing device, shall have good homogeneous paste, easy workability and should be lumps free.

4.3.1 In addition, it shall work readily and smoothly under a palette knife/putty blade.

4.4 Lead Restriction

The material shall not contain lead or compounds of lead or mixtures of both, as metallic lead more than 90 ppm, when tested for restriction from lead in accordance with ASTM D3335-85a.

4.5 The material shall also comply with the requirements given in Table 1.

Table 1 Requirements for White Cement Based Polymeric Putty
(Clause 4.5)

Sl No.	Test	Requirement	Method of Test
(1)	(2)	(3)	(4)
i)	Tensile adhesion strength (avg. of min 3 readings) @ 14 days, N/mm ² , <i>Min</i>	0.80	Annex B
ii)	Water retentivity, percent, <i>min</i>	95 percent	Annex C
iii)	Setting time Initial, <i>Min</i> Final, <i>Max</i>	180 minutes 500 minutes	Annex D
iv)	Polymer content (based on loss on ignition), percent by mass, <i>Min</i>	1.5	Annex E
v)	Degree of whiteness, percent, <i>Min</i>	85	Annex B of IS 8042
vi)	Cement content, percent, <i>Min</i>	18	Annex B of IS 5410

4.6 Optional Requirements

Table 2 Optional Requirements for White Cement Based Polymeric Putty
(Clause 4.6)

Sl No	Test	Requirement	Test Method
(1)	(2)	(3)	(4)
i)	Compressive strength, 28 days, <i>Min</i>	5 N/mm ²	IS 4031 (Part 6)

5 PACKING AND MARKING

5.1 Packing

The material shall be suitably packed as agreed to between the purchaser and the supplier. Packing should be such that material shall not absorb any moisture.

5.2 Marking

Each pack shall be marked with following:

- Name of the material;
- Name of manufacturer;
- Batch number or Lot number in code or otherwise;
- Month and year of manufacture;
- Trade-mark; if any
- Weight of the material;

- g) Lead content, *Max*; and
- h) A cautionary note as below:
 - 1) Keep out of reach of children.
 - 2) Dried film of this putty may be harmful if eaten or chewed.
 - 3) This product may be harmful if swallowed or inhaled.

5.3 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative samples of the material shall be drawn as prescribed in IS 101 (Part 1/Sec 1) : 1986.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
101 (Part 1/Sec 1) : 1986	Methods of sampling and test for paints, varnishes and related products: Part 1 Test on liquid paints (general and physical), Section 1 Sampling	5410 : 2013	Cement paint — Specification
		8042 : 2015	White Portland cement — Specification
4031 (Part 6) : 1988	Methods of physical tests for hydraulic cement: Part 6 Determination of compressive strength of hydraulic cement (other than masonry cement)	ASTM D3335- 85a : 2014	Standard test method for measuring low concentrations of lead, cadmium, and cobalt in paints by atomic absorption spectroscopy

ANNEX B

[Clause 4.5, Table 1 Sl No. (i)]

DETERMINATION OF THE TENSILE ADHESION STRENGTH**B-1 GENERAL**

The objective of this test is to evaluate the adhesion (pull-off strength) of putty coating by determining the tensile pull off force that it can bear before detaching.

B-2 PRINCIPAL

Pull-off test is performed by securing a loading fixture (dolly) normal (perpendicular) to the surface of the coating with an adhesive. After the adhesive is cured, a testing apparatus is attached to the loading fixture and aligned to apply tension normal to the test surface. The force applied to the loading fixture is then gradually increased and monitored until either a plug of material is detached, or a specified value is reached. When a plug of material is detached, the exposed surface represents the plane of limiting strength within the system.

B-3 INSTRUMENTS**B-3.1 Weighing Balance****B-3.2 Stirrer Machine****B-3.3 Spatula****B-3.4 Measuring Cylinder (100 and 500 ml capacity).****B-3.5 Mixing Pot****B-3.6 A Steel Bowl****B-3.7 Hole Saw/Core Driller (54 mm diameter).****B-3.8 Putty Blade with Handle****B-3.9 Pull off Tester Machine****B-3.10 Adhesive (Epoxy + Hardener)****B-3.11 Dolly (50 mm diameter)**

B-3.12 Substrate (Concrete Block) — Concrete slab are prepared with 1 : 5 ratio (1 Part of OPC: 5 of part screened natural sand which is used usually in normal plaster). The dimension of slab is 12 × 12 × 22-28 mm thickness. Slabs after preparation, cured (wet curing) for at least min 28 days. These slabs are used as substrates for wall putty quality testing.

B-4 TEMPERATURE AND HUMIDITY

The temperature of testing lab shall be 27±2 °C. The relative humidity of the laboratory shall be 65 ± 5 percent.

B-5 PROCEDURE**B-5.1 Determination of Total Water Demand of Sample**

Take the 100 gms of sample in a steel bowl and take normal potable water in a measuring cylinder of capacity 100 ml. Then add water slowly in to sample and thoroughly mix it by hand. Add water until sample mixed up completely and become homogeneous and paste of suitable consistency for application. Ensure

that the putty paste should be lump free and smooth. Now measure consumed quantity of water. This consumed water volume is called Total Water Demand.

B-5.2 Take 20 percent of water of total required water demand in mixing pot. Then take 500 gm sample in this mixing pot and add remaining 80 percent water on it. Prepare the sample paste by using mechanical stirrer. Ensure that sample paste should be lump free and homogeneously mixed.

B-5.3 Application of Above Paste on Concrete Slab

Take one concrete slab and clean it with normal water and putty blade to smoothen the surface or to remove any lump. Apply sample paste on concrete slab. First coat of paste should be applied with pressure on the concrete slab to fill pores of surface. Leave the surface for 6-7 h for drying. After drying clean the surface with putty blade and cloth and apply the

second coat (thickness of both the coats should be upto 2.0 mm (*Max*). After 15-20 min make three grooves (54 mm dia) on the surface by using core driller/hole saw for adhesion test and keep it for 14 days at room temp $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$. After 14 days fix the dolly on the grooved surface by using adhesive and allow to leave it 8-10 h for drying at room temp. After 8-10 h detach the dollies by using hydraulic pull off tester machine which shows the pull-off strength in N/mm^2 .

B-6 CALCULATION/EVALUATION

B-6.1 Hydraulic pull off tester machine shows the pull-off strength in N/mm^2 .

B-6.2 Note down the all the reading and take the average of three readings.

B-6.3 Average reading is the pull-off strength of putty.

ANNEX C

[Clause 4.5, Table 1, Sl No. (ii)]

DETERMINATION OF WATER RETENTIVITY

C-1 GENERAL

The objective of this test is to evaluate the water retentivity of the Sample.

C-2 PRINCIPAL

When amount of the water retained after suction is measured and expressed as a percentage of the original water content, it is termed as “water retentivity”.

C-3 INSTRUMENTS

C-3.1 Mould made from a rigid material with 100 mm internal diameter and 25 mm internal depth.

C-3.2 Standard two kg weight.

C-3.3 Putty blade with handle.

C-3.4 Two rigid non-porous plate (glass plate size approx. – 220 (L) cm × 190 (W) cm and thickness approx. 4 to 6 mm).

C-3.5 One thin white filter paper, 110 mm in diameter.

C-3.6 One disc of thick white filter paper, 200 g/m^2 , 110 mm in diameter.

C-3.7 Analytical weighing balance.

C-3.8 Stop watch.

C-3.9 Measuring cylinder (capacity-500 ml).

C-3.10 Instrument parameters.

C-3.10.1 Weighing balance should be calibrated.

C-3.10.2 The temperature of testing lab shall be $27 \pm 2^{\circ}\text{C}$. The relative humidity of the laboratory shall be 65 ± 5 percent.

C-4 PROCEDURE

Take 20 percent water of total required water demand (see B-5.1) in mixing pot. Then put 1 kg sample in mixing pot and add remaining 80 percent water on it. Prepare the sample paste by using mechanical stirrer. Ensure that sample paste should be lump free and just like as butter. Keep the paste for two hours and perform the test as follows.

C-4.1 Take a mould, two glass plate and one thick white filter paper and one thin white filter paper. Note down the weights of thick white filter paper (X_1 gm) and thin white filter paper (Z_1 gm). Put one glass plate on weighing balance and keep the mould (in dry condition) on glass plate then tare it to zero.

C-4.2 Then remove the same from weighing balance and fill the mould with prepared sample paste in two steps with help of taping rod and strike off excess sample to get levelled surface with using putty blade. Remove all the putty from the outside of the mould and immediately put on weighing balance and note down the weight (A gm). Calculate the mass of water

originally present in the mould (B) from the mass of putty in the mould as follows:

$$B = A \times W$$

where

W = Fraction of water in putty mix' present in putty (mixed with water)

Cover the surface of the sample with the one piece of thin white filter paper, and place the one disc of extra white filter paper on top of the gauze. Place the glass plate on top of this and load with the 2 kg weight, then start the stop watch. Remove the two kg weight after 2 min.

Weigh the filter papers, suppose weight of one thick white filter paper is X_2 gm then calculate the mass of water removed as given below:

$$(X_2 - X_1) = C \text{ gm}$$

The mass of water retained by the putty after suction (that is, the mass of water originally present in

the mould minus the mass of water absorbed by the filter paper), expressed as a percentage of the mass of water originally present in the mould full of putty, shall be taken as the water retentivity.

C-5 CALCULATION

$$\text{Water retentivity, percent} = \frac{B - C}{B} \times 100$$

C-6 PRECAUTIONS

- Record the values up to three decimals;
- All appliances should be dry and clean;
- Ensure to put the mould at the centre of glass plate;
- Thick white filter paper and thin white filter paper should be not reused;
- Mould filling time should not exceed 2 min; and
- The mould should be done in two layers.

ANNEX D

[Clause 4.5, Table 1, Sl No. (iii)]

DETERMINATION OF THE SETTING TIME

D-1 GENERAL

The objective of this test is to evaluate the initial and final setting time of sample.

D-2 INSTRUMENTS

D-2.1 Weighing Balance

D-2.2 Stirrer Machine

D-2.3 Spatula

D-2.4 Measuring Cylinder (500 ml capacity)

D-2.5 Mixing Pot

D-2.6 Putty Blades with Handle

D-2.7 Setting Time Mould

D-2.8 Tamping Rod

D-2.9 Instrument Parameters

D-2.9.1 Weighing Balance, should be calibrated.

D-2.9.2 The temperature of testing lab shall be 27 ± 2 °C. The relative humidity of the laboratory shall be 65 ± 5 percent.

D-2.9.3 Vicat Apparatus, with complete accessories.

D-3 PROCEDURE

Take 20 percent water of total required water demand (see **B-5.1**) in mixing pot. Then take 500 gm sample in mixing pot and add remaining 80 percent water on it. Prepare the sample paste by using mechanical stirrer. Ensure that sample paste should be lump free and just like as butter. Take a clean setting time mould and apply the thin film of grease inside the mould and fill the mould with prepared paste in two steps by taping rod and strike off the excess sample paste with putty blade for levelling the mould surface.

On filled the mould mark the time and identity, then keep it in the humidity chamber at 90 ± 5 percent RH.

D-4 CALCULATIONS

D-4.1 Determination of Initial Setting Time

The needle when released, fails to penetrate the block for 5 ± 0.5 mm measured from the bottom of the mould.

D-4.2 Determination of Final Setting Time

Product shall be considered as finally set when the flat disc needle stop making an impression on the mould when released.

D-4.3 The results of initial and final setting time shall be reported to the nearest five minutes.

ANNEX E

[Clause 4.5, Table 1, Sl No. (iv)]

DETERMINATION OF POLYMER CONTENT (BASED ON LOSS ON IGNITION)

E-1 OBJECTIVE

The objective of this test is to evaluate the loss on ignition of sample.

E-2 PRINCIPAL

Loss on ignition refers to the release of volatile matter such as CO₂, water vapour and other combustibles.

E-3 INSTRUMENTS

E-3.1 Analytical Weighing Balance, with an accuracy of 1 mg.

E-3.2 Silica Crucible

E-3.3 Small Spatula

E-3.4 Muffle Furnace (temp up to 1200 °C).

E-3.5 Desiccator with Silica Gel

E-3.6 Instrument Parameters

E-3.6.1 Muffle furnace, should be calibrated.

E-3.6.2 The temperature of testing lab shall be 27±2 °C. The relative humidity of the laboratory shall be 65±5 percent.

E-4 PROCEDURE

Take 50 g sample and heat it at 105 °C for 2 h in an air circulated oven. Remove the sample and store it in desiccator. Use this sample to test the organic content.

Keep the crucible in muffle furnace at 500 °C. Allow the crucible to attain room temperature by putting it in desiccator. Weigh the silica/nickel crucible on analytical weighing balance and note the weight (W₁). Now tare the weight of crucible and weigh 5-7 grams of sample (W₂) in the crucible. Keep the crucible in muffle furnace at 550 °C for half an hour. After half an hour, take the crucible out from furnace and keep in desiccator for cooling. After cooling down, weigh the crucible again (W₃).

E-5 CALCULATION

Polymer content (based on loss on ignition at 550 °C)

$$= \frac{[(W_1 + W_2) - W_3]}{W_2} \times 100$$

ANNEX F*(Foreword)***COMMITTEE COMPOSITION**

Paints, Varnishes and Related Products Sectional Committee, CHD 20

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